NEW OAKLAND CITY LAKE

Gibson County

2007 Fish Management Report

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EXECUTIVE SUMMARY

- A general survey was conducted on June 18 and 19, 2007. Submersed aquatic vegetation was sampled on July 31.

- The Secchi disk depth was 12.2 ft and DO concentrations were marginal for fish survival below 16.0 ft. The conductivity was 92 µS.

- Submersed vegetation was found at 100% of the littoral sites to a maximum depth of 14.0 ft. Seven native species, leafy pondweed, chara, slender naiad, coontail, waterthread pondweed, sago pondweed, and brittle naiad, and one non-native species, Eurasian watermilfoil were collected. Coontail was the most frequently occurring (85%), followed by slender naiad (73%), leafy pondweed (20%), and chara (20%).

- A total of 384 fish, representing seven species, was collected that weighed an estimated 114 lbs. Bluegill ranked first by number (46%), followed by largemouth bass (26%), and redear sunfish (10%). Largemouth bass ranked first by weight (43%), followed by channel catfish (31%), and bluegill (15%). Warmouth, black crappie, and green sunfish were also collected.

- Bluegill grew fast with age-2 and age-4 fish averaging 4.4 and 7.6 in.

- The bluegill population has improved since 2003. Numbers have substantially decreased while growth has improved. This decrease in intraspecific competition led to the improved growth.

- The largemouth bass population is similar to the last survey. There were no fish collected that reached 14.0 in and growth was average. Therefore, either sublegal bass are being harvested or the ages obtained by scales are inaccurate.

- Historically this lake has never been a good lake to catch "big" bass. The goal for this lake should be to maintain the size of the bass population to ensure adequate predation on bluegill. This will help make certain that the good panfishing continues.

- Aquatic herbicides should continue to be used to reduce vegetation abundance.

- A supplemental electrofishing survey should be conducted in 2010, specifically looking at the bass and bluegill populations.

- Largemouth bass length limit signs should be given to the Town for posting.

INTRODUCTION

New Oakland City Lake is a 69-acre impoundment located approximately 4.0 mi southeast of Oakland City. The lake was constructed in 1925 as a secondary water supply lake. Boat access is provided by two gravel launching ramps and use of outboard motors is not allowed. The entire north shoreline and the area around the boat ramps are accessible for bank fishing. There are no boat launching or access fees.

Past fish management practices have included a fish renovation in 1966, after which the lake was restocked with largemouth bass, redear sunfish, bluegill, and black crappie. Channel catfish are stocked biennially by the Division of Fish and Wildlife (DFW).

The 2003 survey revealed high bluegill density with slow growth, and average largemouth bass density with slow to average growth. No largemouth bass greater than 13.0 in were collected. Aquatic vegetation abundance was high and a treatment plan was developed. Aquatic herbicides have been used annually since 2005 to reduce vegetation abundance.

METHODS

A general survey was conducted on June 18 and 19, 2007. Some of the lake's physical and chemical characteristics were measured. Submersed aquatic vegetation was sampled on July 31 using guidelines written by the Indiana Department of Natural Resources (2006).

Fish collection effort consisted of pulsed DC night electrofishing with two dippers for 0.75 h, one trap net lift, and four experimental-mesh gill net lifts. The number of trap net lifts was less than the standard guidelines due to net tampering. All other sampling was done in accordance with the DFW sampling guidelines (Shipman 2001). All fish collected were measured to the nearest 0.1 in TL. Average weights were estimated by using the Fish Management District 7 averages. Scale samples were taken from a subsample of game fish for age and growth analysis. Proportional stock density (PSD) and relative stock density (RSD) indices were calculated for largemouth bass and bluegill (Anderson and Neumann 1996). The bluegill fishing potential index (BGFP) was used to classify the quality of the bluegill fishery (Ball and Tousignant 1996).

RESULTS

New Oakland City Lake has a maximum depth of 20.0 ft. The Secchi disk depth was 12.2 ft and DO concentrations were marginal for fish survival below 16.0 ft. The conductivity was 92 µS.

Submersed vegetation was found at 100% of the littoral sites to a maximum depth of 14.0 ft. Seven native species, brittle naiad, chara, coontail, leafy pondweed, sago pondweed, slender naiad, and waterthread pondweed; and one non-native species, Eurasian watermilfoil were collected. Coontail was the most frequently occurring (85%), followed by slender naiad (73%), leafy pondweed (20%), and chara (20%). Filamentous algae was found at 18% of the sites. Emergent species observed were creeping water primrose, bulrush sp., smartweed, and cattail sp.

A total of 384 fish, representing seven species, was collected that weighed an estimated 114 lbs. Bluegill ranked first by number (46%), followed by largemouth bass (27%), and redear sunfish (10%). Largemouth bass ranked first by weight (43%), followed by channel catfish (31%), and bluegill (15%). Warmouth, black crappie, and green sunfish were also collected. Species collected in past surveys include white crappie, brown bullhead, and golden shiner.

A total of 177 bluegill was sampled that weighed 17 lbs. They ranged in length from 1.2 to 8.4 in. The catch rates were 204.0/electrofishing h, 20.0/trap net lift, and 1.0/gill net lift. The electrofishing catch rate in 2003 was 828.0/h. Bluegill growth improved since 2003. Growth was fast with age-2 and age-4 fish averaging 4.4 and 7.6 in compared to 2.9 and 4.6 in in 2003.

The bluegill PSD substantially increased from 12 (2003) to 56. The suggested PSD range indicating a balanced bluegill fishery is 20 to 60 (Anderson and Neumann 1996). The RSD-7 was 41 and RSD-8 was 8 compared to the 2003 values of 2 and 0. The BGFP index value increased from 15 (2003) to 22, classifying the lake as having “good” bluegill fishing.

A total of 102 largemouth bass was sampled that weighed 49 lbs. They ranged in length from 4.6 to 12.9 in. The catch rates were 126.7/electrofishing h, 0.0/trap net lift, and 1.5/gill net lift. The 2003 electrofishing catch rate was 158.0/h. Largemouth bass growth was good for all ages with age-2 and age-3 bass averaging 9.9 and 11.1 in.

The bass PSD decreased from 11 (2003) to 5. The suggested PSD range indicating a balanced largemouth bass fishery is 40 to 70 (Anderson and Neumann 1996). There were no fish greater than 13.0 in collected in this survey and only one in 2003.

Thirty-seven redear sunfish were sampled that weighed 8 lbs. They ranged in length from 1.8 to 10.6 in. The catch rates were 47.0/electrofishing h, 1.0/trap net lift, and 0.3/gill net lift. The electrofishing catch rate in 2003 was 122.0/h. Redear sunfish growth was average for all ages.

A total of 27 channel catfish was collected that weighed 35 lbs. They ranged in length from 10.0 to 22.5 in. The catch rates were 7.0/electrofishing h, 0.0/trap net lift, and 6.0/gill net lift.

DISCUSSION

New Oakland City Lake provides good fishing for bluegill and channel catfish. Nineteen percent of the bluegill collected were 7.0 in or longer and all ages exhibited excellent growth. Channel catfish were collected up to 22.5 in and 11% were at least 20.0 in. The bass population is mostly comprised of fish less than 14.0 in.

The bluegill population has improved since 2003. Numbers have substantially decreased while growth has improved. This decrease in intraspecific competition led to the improved growth. The population's stock density indices have also increased. The herbicide treatment that is being conducted yearly is the main contributing factor to the improvements in the bluegill population. The decreased vegetation densities have allowed increased predation by largemouth bass which lead to the reduced numbers of bluegill. Excess aquatic vegetation should continue to be treated with herbicides in the future.

The largemouth bass population is similar to the last survey. There were no fish collected that reached 14.0 in and growth was average. Therefore, either sublegal bass are being harvested or the ages obtained by scales are inaccurate. Since all ages of largemouth bass are exhibiting average growth, bass should be growing to harvestable sizes. However, if ages are underestimated, as can happen with scale aging, bass could be slow growing or stunted, resulting in no bass over 12.8 in. Historically this lake has never been a good lake to catch "big" bass. The goal for this lake should be to maintain the size of the bass population to ensure adequate predation on bluegill. This will help make certain that the good panfishing continues. A supplemental electrofishing survey should be conducted in 2010, specifically looking at the bass and bluegill populations. It is also recommended that largemouth bass length limit signs be given to the Town to be posted in high use areas.

RECOMMENDATIONS

- Aquatic herbicides should continue to be used to reduce vegetation abundance.

- A supplemental electrofishing survey should be conducted in 2010 to evaluate the bass and bluegill populations.

- Largemouth bass length limit signs should be given to the Town for posting.

LITERATURE CITED

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-481 *in* B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

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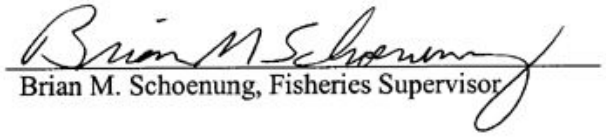
Submitted by: Michelle L. Weinman, Assistant Fisheries Biologist
Date: October 25, 2007

Approved by: Daniel P. Carnahan, Fisheries Biologist
Date: November 1, 2007

Approved by: 
Brian M. Schoenung, Fisheries Supervisor

Date: January 30, 2008

Appendix
Fisheries Survey Data

LAKE SURVEY REPORT

Type of Survey: [ ] Initial Survey [X] Re-Survey

Lake Name	County	Date of survey (Month, day, year)
New Oakland City Lake	Gibson	June 18 and 19, 2007
Biologist's name		**Date of approval (Month, day, year)**
Michelle L. Weinman		January 30, 2008

LOCATION

Quadrangle Name	Range	Section
Oakland City	8W	20, 29
Township Name	**Nearest Town**	
2S	Oakland City	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site: City owned
		Two gravel boat ramps

Surface acres	Maximum depth	Average depth	Acre feet	Water level	Extreme fluctuations
69	20	10	690	460 ft	Limited

Location of benchmark: Near intersection of county roads, southwest of lake, NW¼ Section 29

INLETS

Name	Location	Origin
Unnamed	West end of lake	R8W, T2S, SE¼ of SW¼, S20
Intermittent streams	South side of lake	R8W, T2S, SE¼ of SW¼, S29

OUTLETS

Name	Location
Unnamed	Below dam at east end

Water level control: Spillway near dam

POOL	ELEVATION (Feet MSL)	ACRES
TOP OF DAM	470	
TOP OF FLOOD CONTROL POOL		
TOP OF CONSERVATION POOL	480	69
TOP OF MINIMUM POOL		
STREAMBED		

Bottom type

- [ ] Boulder
- [ ] Gravel
- [ ] Sand
- [X] Muck
- [X] Clay
- [ ] Marl

Watershed use: Agriculture, reclaimed strip mined ground.

Development of shoreline: Primitive boat ramps, parking lot, park, campground, and swimming beach.

Previous surveys and investigations: Fish management surveys conducted in 1965, 1987,1996, and 2003.

Aquatic vegetation surveys: 2004 and 2005.

SAMPLING EFFORT					
ELECTROFISHING	Day hours		Night hours 0.75		Total hours 0.75
TRAP NETS	Number of traps 1		Number of Lifts 1		Total effort 1 overnight lift
GILL NETS	Number of nets 4		Number of Lifts 1		Total effort 4 overnight lifts
ROTENONE	Gallons	ppm	Acre Feet Treated	SHORELINE SEINING	Number of 100 Foot Seine Hauls

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color: Clear	Turbidity: 12 Feet 2 Inches (SECCHI DISK)
Alkalinity (ppm)*: Surface: 34.2 Bottom: 34.2	pH: Surface: 8.4 Bottom: 7.3
Conductivity: 92 microsiemens	Air temperature: °F
Water chemistry GPS coordinates: N 38.32152	W -87.31772

TEMPERATURE AND DISSOLVED OXYGEN (D.O.)								
DEPTH (FEET)	Degrees (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)
SURFACE	83.7	7.6	36			72		
2	83.7	7.6	38			74		
4	83.7	7.6	40			76		
6	83.7	7.6	42			78		
8	83.1	7.6	44			80		
10	81.7	8.0	46			82		
12	78.4	7.4	48			84		
14	72.5	16.7	50			86		
16	65.5	15.5	52			88		
18	61.2	2.3	54			90		
20	58.6	0.7	56			92		
22			58			94		
24			60			96		
26			62			98		
28			64			100		
30			66					
32			68					
34			70					

COMMENTS

*ppm-parts per million

Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake:	New Oakland City	**Secchi (ft):**	9	**SE Mean Species / Site:**	0.16
Date:	7/31/2007	**Littoral Sites w/Plants:**	40	**Mean Natives / Site:**	2.20
Littoral Depth (ft):	14.0	**Number of Species:**	8	**SE Mean Natives / Site:**	0.15
Littoral Sites:	40	**Max. Species / Site:**	6	**Species Diversity:**	0.73
Total Sites:	40	**Mean Species / Site:**	2.23	**Native Diversity:**	0.72

	Frequency of	Score Frequency				
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Coontail	85.0	15.0	50.0	12.5	22.5	40.0
Slender naiad	72.5	27.5	65.0	7.5	0.0	17.5
Leafy pondweed	20.0	80.0	20.0	0.0	0.0	4.0
Chara	20.0	80.0	20.0	0.0	0.0	4.0
Waterthread pondweed	17.5	82.5	15.0	0.0	2.5	5.5
Sago pondweed	2.5	97.5	2.5	0.0	0.0	0.5
Brittle naiad	2.5	97.5	2.5	0.0	0.0	0.5
Eurasian watermilfoil	2.5	97.5	2.5	0.0	0.0	0.5
Filamentous algae	17.5					

Other species noted:
Creeping water primrose, smartweed, cattail sp., and bulrush sp.

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER AND WEIGHT					
*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)	WEIGHT (pounds)	PERCENT
Bluegill	177	46.1	1.2 - 8.4	16.97	14.9
Largemouth bass	102	26.6	4.6 -12.9	48.76	42.7
Redear sunfish	37	9.6	1.8 - 10.6	8.17	7.2
Warmouth	36	9.4	2.1 - 8.0	3.63	3.2
Channel catfish	27	7.0	10.0 - 22.5	34.83	30.5
Black crappie	4	1.0	9.1 - 9.7	1.82	1.6
Green sunfish	1	0.3	3.8	0.03	< 0.1
Totals	384			114.21	

*Common names of fishes recognized by the American Fisheries Society.

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF BLUEGILL									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0	11	6.2	0.01	0	19.0				
1.5	24	13.6	0.01	0	19.5				
2.0	29	16.4	0.01	1	20.0				
2.5	32	18.1	0.01	1	20.5				
3.0	7	4.0	0.02	1, 2	21.0				
3.5	9	5.1	0.03	2	21.5				
4.0	3	1.7	0.05	2, 3	22.0				
4.5	2	1.1	0.07	2	22.5				
5.0	6	3.4	0.09	2, 3	23.0				
5.5	8	4.5	0.13	2, 3	23.5				
6.0	7	4.0	0.17	2, 3, 4	24.0				
6.5	5	2.8	0.22	3, 4	24.5				
7.0	9	5.1	0.28	3, 4	25.0				
7.5	19	10.7	0.34	3, 4	25.5				
8.0	6	3.4	0.41	3, 4	26.0				
8.5					TOTAL	177			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	204.0/h	GILL NET CATCH	1.0/lift	TRAP NET CATCH	20.0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LARGEMOUTH BASS									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5	1	1.0	0.04	1	22.5				
5.0	2	2.0	0.06	1	23.0				
5.5	8	7.8	0.08	1	23.5				
6.0	2	2.0	0.10	1	24.0				
6.5	2	2.0	0.13	1	24.5				
7.0					25.0				
7.5					25.5				
8.0					26.0				
8.5	1	1.0	0.24	2	TOTAL	102			
9.0	11	10.8	0.33	2, 3					
9.5	4	3.9	0.39	2, 3					
10.0	13	12.7	0.46	2, 3					
10.5	19	18.6	0.53	2, 3					
11.0	25	24.5	0.62	3					
11.5	10	9.8	0.71	2, 3					
12.0	3	2.9	0.80	3					
12.5	1	1.0	1.02	4					
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	126.7/h	GILL NET CATCH	1.5/lift	TRAP NET CATCH	0.0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF REDEAR SUNFISH									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5	1	2.7	0.01	1	19.5				
2.0	4	10.8	0.01	1	20.0				
2.5					20.5				
3.0	1	2.7	0.02	1	21.0				
3.5					21.5				
4.0					22.0				
4.5	2	5.4	0.07	2	22.5				
5.0	2	5.4	0.09	2, 3	23.0				
5.5	3	8.1	0.13	3	23.5				
6.0	6	16.2	0.17	3, 4	24.0				
6.5	5	13.5	0.22	3, 4	24.5				
7.0	4	10.8	0.27	4	25.0				
7.5	3	8.1	0.33	4	25.5				
8.0	2	5.4	0.40	4	26.0				
8.5	2	5.4	0.48	4	TOTAL	37			
9.0	1	2.7	0.57	4					
9.5									
10.0									
10.5	1	2.7	0.87	5					
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	47.0/h	GILL NET CATCH	1.0/lift	TRAP NET CATCH	0.0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF CHANNEL CATFISH									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5	1	3.7	3.17	
3.0					21.0	1	3.7	3.39	
3.5					21.5				
4.0					22.0				
4.5					22.5	1	3.7	4.28	
5.0					23.0				
5.5					23.5				
6.0					24.0				
6.5					24.5				
7.0					25.0				
7.5					25.5				
8.0					26.0				
8.5					TOTAL	27			
9.0									
9.5									
10.0	2	7.4	0.32						
10.5									
11.0									
11.5									
12.0									
12.5	1	3.7	0.59						
13.0									
13.5	2	7.4	0.75						
14.0	5	18.5	0.84						
14.5	4	14.8	0.97						
15.0	3	11.1	1.08						
15.5	3	11.1	1.20						
16.0	2	7.4	1.36						
16.5									
17.0	1	3.7	1.61						
17.5									
18.0	1	3.7	2.01						
18.5									

ELECTROFISHING CATCH	7.0/h	GILL NET CATCH	6.0/lift	TRAP NET CATCH	0.0/lift

BLUEGILL AGE-LENGTH KEY

Length group (in)	Total number	Sub-sample	AGE 1	2	3	4
1.0	11	6				
1.5	24	6				
2.0	29	5	29			
2.5	32	7	32			
3.0	7	5	3	4		
3.5	9	4		9		
4.0	3	3		2	1	
4.5	2	2		2		
5.0	6	5		5	1	
5.5	8	8		3	5	
6.0	7	5		1	4	1
6.5	5	4			2	3
7.0	9	7			5	4
7.5	19	7			5	14
8.0	6	5			2	4
Totals	177	79	64	26	26	25

AGE-LENGTH KEY SUMMARY						
Age	Number	Mean TL	Var	SE	Lower 95%CI	Upper 95%CI
1	64	2.5	0.08	0.04	2.5	2.6
2	26	4.4	0.92	0.19	4.0	4.8
3	26	6.8	1.05	0.20	6.4	7.2
4	25	7.6	0.28	0.11	7.3	7.8

LARGEMOUTH BASS AGE-LENGTH KEY

Length group (in)	Total number	Sub-sample	AGE 1	2	3	4
4.5	1	1	1			
5.0	2	2	2			
5.5	8	5	8			
6.0	2	2	2			
6.5	2	2	2			
7.0						
7.5						
8.0						
8.5	1	1		1		
9.0	11	7		9	2	
9.5	4	5		3	1	
10.0	13	6		7	6	
10.5	19	6		3	16	
11.0	25	6			25	
11.5	10	6		2	8	
12.0	3	3			3	
12.5	1	1				1
Totals	102	53	15	25	61	1

AGE-LENGTH KEY SUMMARY						
Age	Number	Mean TL	Var	SE	Lower 95%CI	Upper 95%CI
1	15	5.8	0.28	0.14	5.5	6.1
2	25	9.9	0.59	0.15	9.6	10.2
3	61	11.1	0.36	0.08	10.9	11.2
4	1	12.8				

REDEAR SUNFISH AGE-LENGTH KEY

Length group (in)	Total number	Sub-sample	AGE 1	2	3	4	5
1.5	1	1	1				
2.0	4	4	4				
2.5							
3.0	1	1	1				
3.5							
4.0							
4.5	2	2		2			
5.0	2	2		2			
5.5	3	3			3		
6.0	6	6			3	3	
6.5	5	5			2	3	
7.0	4	4				4	
7.5	3	3				3	
8.0	2	1				2	
8.5	2	2				2	
9.0	1	1				1	
9.5							
10.0							
10.5	1	1					1
Totals	37	36	6	4	8	18	1

AGE-LENGTH KEY SUMMARY						
Age	Number	Mean TL	Var	SE	Lower 95%CI	Upper 95%CI
1	6	2.3	0.24	0.20	1.9	2.7
2	4	5.0	0.08	0.14	4.7	5.3
3	8	6.2	0.17	0.15	5.9	6.5
4	18	7.5	0.83	0.21	7.0	7.9
5	1	10.8				

GPS LOCATION OF SAMPLING EQUIPMENT									
GILL NETS			TRAP NETS			ELECTROFISHING			
1	N 38.31925	W -87.31798	1	N 38.32192	W -87.32593	1	N 38.32225	W -87.32625
2	N 38.31920	W -87.31953	2	N	W		N 38.32157	W -87.32320
3	N 38.31975	W -87.32192	3	N	W	2	N 38.32118	W -87.32200
4	N 38.32190	W -87.32293	4	N	W		N 38.31860	W -87.32452
5	N	W	5	N	W	3	N 38.31912	W -87.32307
6	N	W	6	N	W		N 38.31815	W -87.32012
7	N	W	7	N	W	4	N	W
8	N	W	8	N	W		N	W
9	N	W	9	N	W	5	N	W
10	N	W	10	N	W		N	W
11	N	W	11	N	W	6	N	W
12	N	W	12	N	W		N	W
13	N	W	13	N	W	7	N	W
14	N	W	14	N	W		N	W
15	N	W	15	N	W	8	N	W
16	N	W	16	N	W		N	W
17	N	W	17	N	W	9	N	W
18	N	W	18	N	W		N	W
19	N	W	19	N	W	10	N	W
20	N	W	20	N	W		N	W
						11	N	W
							N	W
						12	N	W
							N	W
						13	N	W
							N	W
						14	N	W
							N	W
						15	N	W
							N	W
						16	N	W
							N	W
						17	N	W
							N	W
						18	N	W
							N	W
						19	N	W
							N	W
						20	N	W
							N	W